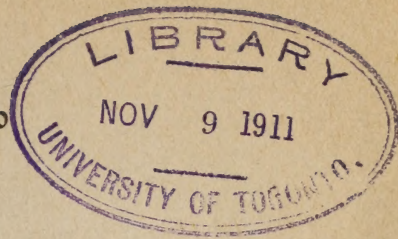


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INFLUENCE OF TRADE EDUCATION UPON WAGES

A DISSERTATION

SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL OF ARTS
AND LITERATURE IN CANDIDACY FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY

(DEPARTMENT OF POLITICAL ECONOMY)

BY

GEORGE ASBURY STEPHENS

Reprinted from THE JOURNAL OF POLITICAL ECONOMY, Vol. XIX, No. 1
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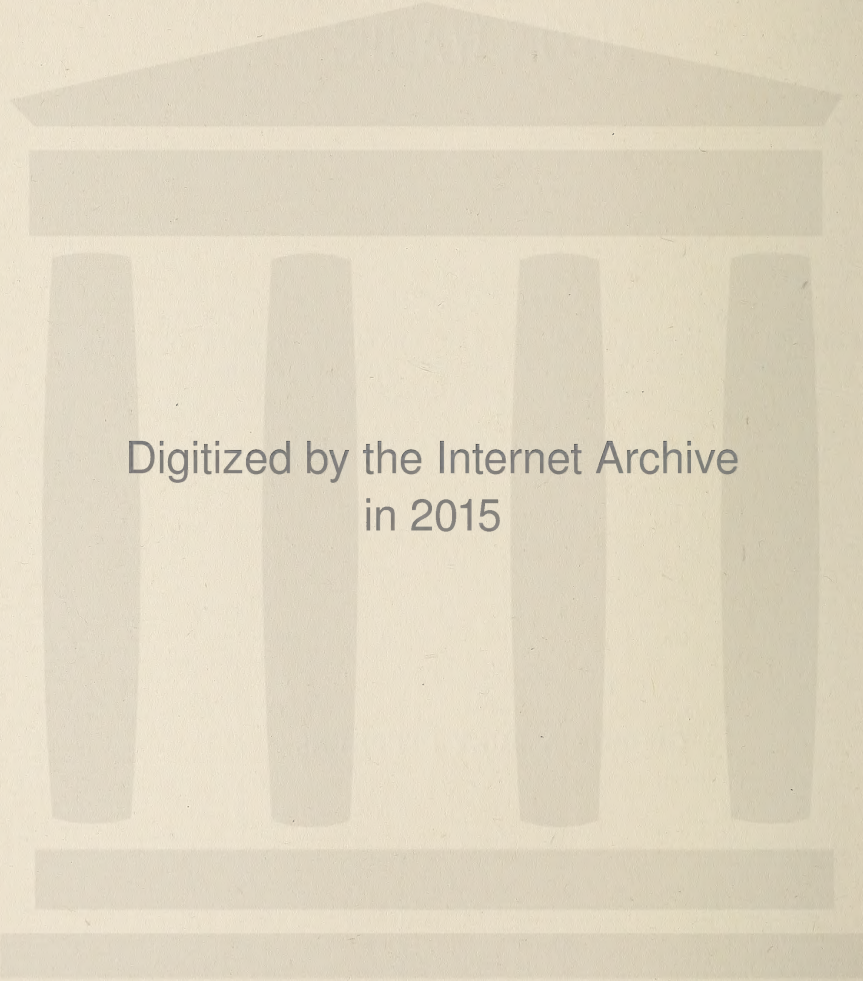
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THE NEW APPRENTICESHIP

I. DECAY OF THE TRADITIONAL FORM OF APPRENTICESHIP

It is frequently asserted that apprenticeship, as a means of trade education, has disappeared. Thus the New Jersey Commission on Industrial Education, after an investigation which included over 2,000 firms engaged in manufacturing, building, and other productive industries employing upward of 250,000 workers, male and female, states in its report to the governor early in 1909: "The apprenticeship system has been virtually abandoned as a means of instructing the young in the various trades."¹ This statement is far too sweeping. The traditional form of apprenticeship is still in vogue in many trades throughout the country.

Carroll D. Wright, in a bulletin of the Bureau of Education, giving an account of the apprenticeship system in its relation to industrial education, says:

Incidentally the investigation has developed the fact that the apprenticeship system is a power to be reckoned with, and that it exists in all parts of the Union, and not only that, but that law protects to some extent the employment of apprentices, although in many instances, of course, such laws are practically dead letters. But the conclusion that the system does prevail in all parts of the Union and under varied conditions, and to an extent that has not been realized, is thoroughly warranted.²

The Massachusetts Bureau of Statistics of Labor in its annual report for 1906 gave attention to the apprenticeship system in Massachusetts. Of 58 employers in a large variety of industries from whom replies were received, 31 had a system of apprenticeship. Of 104 officers of trade unions from whom replies were received, 55 represented trades in which there was a system of apprenticeship.³

¹ *Report of the Commission on Industrial Education in the State of New Jersey* (1909), 5.

² "The Apprenticeship System in Its Relation to Industrial Education," *Bulletin* No. 6, United States Bureau of Education (1908), 19.

³ Part I of the *Annual Report of the Massachusetts Bureau of Statistics of Labor* ("The Apprenticeship System"), 1906, 6.

In a report of the apprenticeship committee of the National Machine Tool Builders' Association made in 1906, an account of an investigation made by the committee is given. Out of 100 representative concerns, including machine tool builders, electrical manufacturers, engine builders, automobile manufacturers, etc., replies were received from 77. Of these, 13 employed no apprentices; 29 employed apprentices under verbal agreement only; and 35 employed indentured apprentices. Even assuming that those concerns which did not reply employed no apprentices, there were still 64 per cent of the whole number which did employ them, and 35 per cent which followed the old indenture system.⁴

Out of 124 replies from leading manufacturers in the state of Ohio, received by President Charles S. Howe, of the Case School of Applied Science, Cleveland, Ohio, in 1907, 56 were to the effect that they had apprenticeship systems and 24 that they had no systems, because they had few men employed, but expected with growth of business to establish such a system. Again, 64 per cent of the replies received were favorable to an apprenticeship system.⁵

Mr. C. W. Cross, superintendent of apprentices of the New York Central Railway lines, and his assistant, Mr. W. B. Russell, recently made an investigation of apprenticeship systems of the large railroads of the United States. Fifty-eight railroads were found to have 7,053 apprentices in 368 shop plants, while 67 plants had no apprentices.⁶ Undoubtedly the systems followed by these railways are widely different from the old indenture and shop-training systems, but the showing indicates that some sort of apprenticeship system is being largely employed.

Dr. James M. Motley in his *Apprenticeship in American Trade Unions* states that out of 120 national and international trade unions, with a total of 1,676,200 members, affiliated in 1904 with the American Federation of Labor, some 70, having

⁴ *Official Report of the Fifth Annual Convention for 1906 of the National Machine Tool Builders' Association*, 8-9.

⁵ "The Apprenticeship System in Its Relation to Industrial Education," *op cit.*, 18-19.

⁶ *Ibid.*, 43.

a membership of about 900,000, maintained apprenticeship systems and attempted to enforce union regulations.⁷

The apprenticeship system, as has been indicated, survives in a large part of the field of industry. Nevertheless, most students of industrial economics are agreed that the old-fashioned apprenticeship is no longer adequate to the task of maintaining the supply of skilled labor. Three reasons may be given for this state of affairs: (1) The presence of apprentices in the best equipped shops is of doubtful advantage to the employers; (2) organized labor is disposed to hedge apprenticeship about with restrictions that discourage the average employer from taking on apprentices; (3) in the stress of modern industrial life the apprentices in a shop are likely to be neglected. The master workman, upon whom the obligation of training the apprentice formerly rested, has largely disappeared; and the journeyman of today cannot be expected to assume this obligation with zeal.

1. Trade education is expensive, and it is not less so when it is acquired in a shop through apprenticeship. If a private employer undertakes the training of workmen, it must be with the expectation of a profit. As Mr. W. R. Warner, of the Warner & Swasey Co., Cleveland, Ohio, well puts it:

The aims of the manufacturer are purely commercial; this is to be admitted frankly. Our schools are founded on philanthropic principles to aid those who come to them, but the manufacturer takes an apprentice for only one purpose, to make money out of his services, certainly not to lose money. It is purely a business proposition. The apprentice comes to the manufacturer for a purpose—for an education in mechanical lines. Can these two purposes be realized? Can I take an apprentice and so guide and manage his work that the result will be profitable to me and at the same time give him an education? I believe it can be done; indeed it is being done by all the concerns I have mentioned, for the young men who are in the shops referred to do acquire a knowledge of the work.⁸

⁷ "Johns Hopkins University Studies in Historical and Political Science," Series XXV, Nos. 11-12 (November to December, 1907). Confirmatory of Dr. Motley's statement is the recent correspondence of the writer with the secretaries and other officials of upward of 50 international unions as well as his study of a large number of the general constitutions of the unions and their trade agreements with their employers.

⁸ *Bulletin No. 5*, National Society for the Promotion of Industrial Education,

A more pessimistic view of the situation is taken by many employers. In a discussion of the effect of trade-union limitation upon the number of apprentices, the Commissioner of Labor writes:

The unions are disposed to limit the number of apprentices, because otherwise employers would be disposed to employ as many apprentices as possible and as few journeymen as possible. In many trades (building), however, employers enter no complaints about the limitation of apprentices. Some employers do not have as many apprentices as the unions permit them to have, and some do not have any at all. Indeed, there seems to be a growing disinclination to have apprentices. Among the reasons for this are that apprentices, while learning the trade, spoil much material and damage tools, and the time of foremen or other workmen is required to train them. Perhaps the strongest reason is that many apprentices, having become sufficiently proficient for their services to be of some value, quit their employers under whom they have been trained and engage themselves as journeymen to other employers, although their term of apprenticeship may not have expired. Thus the first employer is deprived of the profit which he expected to realize from the latter part of the term of apprenticeship as compensation for the loss which the apprentice caused while being trained.⁹

Again, concerning apprenticeship in the bricklaying trade in New York City, the same authority uses these words:

In New York the term [of apprenticeship] is 4 years, and 3 apprentices are allowed to an employer, as well as a fourth, who, however, must be the son of a bricklayer. Employers do not complain about the limited number of apprentices, and few of them think that apprentices pay. The trade is recruited largely from the country.¹⁰

An officer of the Cut Stone Contractors' Association of Chicago is reported to have said: "The rules as to apprentices are satisfactory. My firm has no apprentices; we do not want any."¹¹

The same attitude has been maintained by the members of the Chicago Employing Plasterers' Association. In an agreement in 1903 between the Chicago lathers and members of this association, it was stipulated that no apprentices should be allowed.

⁹ *Eleventh Special Report of the Commissioner of Labor* (1904), 270-71.

¹⁰ *Ibid.*, 283.

¹¹ *Ibid.*, 351.

As a matter of fact [the Commissioner's report goes on to state] no apprentices have been allowed since the lockout of 1900. The officials of the union say that the reason for the rule is to prevent contractors from employing boys. However, the contractors generally do not object to the non-apprentice rule, as they usually prefer to have journeymen only.¹²

Similar conditions obtain in the New York City newspaper offices:

The New York local adopted a rule to the effect that "hereafter no apprentices shall be received or recognized by the union on morning or afternoon newspapers." The rule is strictly enforced and holds in all union offices, except where a few apprentices have held over when the office was unionized. This restriction is not objected to by the newspaper publishers, since they do not wish apprentices, and declare that it would not pay to train them. The scale of wages in New York is so high that publishers are able to secure the most expert help from all parts of the country, and it is in this way that New York offices obtain new employees. . . .

This absolute prohibition of apprentices in daily newspaper offices is confined, however, to New York City and Philadelphia, so far as this investigation divulged. In Chicago the question of apprentices was submitted to arbitration, the union asking a ratio of 1 to 7, the publishers wishing 1 to 5. The condition in Chicago is somewhat similar to that in New York, so far as drawing from smaller outside towns is concerned; and so strongly did the union put its case before the conference that it was decided the ratio should be 1 to 10, or considerably less than the union had asked for.¹³

The cigar-making trade affords another instructive example of the disinclination of employers to take on apprentices under the old system, whatever may be the ratio of apprentices to journeymen agreed upon by unions and employers. This is particularly true in the larger cities where the training of apprentices adds an expense relatively greater than in the small towns. In these cities it is not so much a question of conformity to union demands with regard to wages of apprentices as it is a matter of unprofitable expense to employ and train apprentices under any conditions. This is proven by the fact that non-union and open shops employ no more apprentices than do union shops. The inevitable result is that most apprentices must find employment in the small shops of the small town or

¹² *Ibid.*, 322.

¹³ *Ibid.*, 86.

get their instruction in a school, where the expense for training is light. A New York City school for training cigar-makers turns out annually some 400 graduates, charging a tuition of only \$10.

But of the 1,650 employees of the largest open cigar-making establishment investigated by the Bureau of Labor,

only 10 of the employees are apprentices, and they are engaged in learning to make cigars by hand. The other 6 open and 2 non-union factories have no apprentices, so that out of a total of 4,169 employees of the 7 open and 2 non-union factories only 10 are apprentices. In making 5-cent cigars all of these factories save one use machinery, and only a few weeks are required for persons to learn to operate the machines. But all of these factories also make 10-cent cigars by hand work entirely, and it is noticeable that of the 9 factories 8 have no apprentices, even in making hand-made cigars.

In the 8 union factories from which reports were obtained the percentage of apprentices is larger than in the open and the non-union shops, but it is still very small. The total number of employees in these factories is 527, the number of apprentices being but six, or a little more than 1 per cent. Five of the 8 union factories have no apprentices. However, the manufacturers, whether employing union labor or not, do not desire many apprentices.

Some of the reasons why employers are disinclined to have apprentices is that they spoil tobacco in learning the trade, the time of the foreman is required to train them, and where rents are high the space they occupy is valuable. The strongest reason, perhaps, is that apprentices are not indentured under the law, and when they have learned the trade can leave the shop where they have been taught and secure employment elsewhere. In such case the employer who has trained the apprentice at an actual loss has no chance to profit by his labor after he has learned to be an efficient workman.¹⁴

The mere fact that apprenticeship is burdensome to the individual employer does not prove that employers as a class might not find their profit in continuing the system. If all employers of a given trade, who are in competition with one another, were bound by agreement or otherwise to take a number of apprentices proportionate to the number of journeymen employed or to the output of the concern and to take them on precisely like terms, the expense of trade education through apprenticeship would fall on all employers alike, and would be shifted to the consumer of the commodity produced by the

¹⁴ *Ibid.*, 580.

trade, in a correspondingly higher price. But, as a matter of fact, by joint trade agreement between union and employer, only the maximum number of apprentices is fixed. The employer is under no obligations to take any. With this freedom he of course takes them only as their employment helps him to meet the competition of rival employers. That is to say, if apprentices under given conditions and at given wages for the average term the employer can count on them to remain with him are less profitable to him than journeymen, then ordinarily he refuses to take them on. His competitors will not undergo this additional expense, and he cannot, if he would meet competition.

2. The attitude of the trade unions toward the employment of apprentices finds its explanation in statements such as the following, given by a vice-president of the American Flint Glass Workers' Union:

We have no apprentices, because in the past it meant simply cheap labor. The bosses would put them on as gatherers and agree to pay full rate after 6 months of continuous blowing. They would keep them on for 4 months and take them off a few months and put another apprentice gatherer on, in a few months take him off and put the first back on again, getting sometimes, many times, 6 months' work out of him at apprentice rates. Not that all manufacturers would do this, but it gave those who resorted to such tactics an advantage over those who would not, and had to be stopped, not only in the interests of the trade, but in the interests of competitive equality among the manufacturers. What they called apprenticeship was simply made a scheme for producing a cheapened chimney. A gatherer can blow in 8 or 10 weeks as well as he ever can, but of course not as much. Now the union simply says that chimneys must be paid for at list price, whether blown by apprentices or not. Everything packed and sold must pay the list price. We do not say there shall be no apprentices. We claim that the fact that the bosses do not put them on shows that it is not apprentices, but cheap labor which they want. For instance, we permit finishing boys to blow four or five dobs a day, and at this rate they can learn the business, in a reasonable time, but as soon as one blows a chimney which is accepted by the firm, packed and sold, he must be paid the scale price for that chimney.¹⁵

It is easy to see how, in particular cases, either the employer or the union may be held chiefly responsible for the denial of opportunity to young men desirous of learning a trade. The

¹⁵ *Eleventh Special Report of the Commissioner of Labor (1904)*, 651.

union too often expects a boy to be paid for his work such a wage as will make the ratio of his wage to his output equal to that of the journeyman's wage to his output, regardless of the expense the boy as an apprentice is to his employer. The employer naturally insists on this expense being taken into account. Sometimes, however, under color of taking compensation for instruction the employer exacts from the boy an output which is more than is necessary to place the latter on a basis of commercial equality with the journeyman. Such an exaction the union very properly regards, not only as an exploitation of the apprentice, but also as a means for ultimately reducing journeymen's wages. It may be possible, in theory, to arrive at an adjustment which will be fair both to the employer and to organized labor. In practice, however, such nicety of adjustment is hardly attainable in the changing conditions of modern industrial life.

3. It cannot be said that apprenticeship, as it exists today, is a satisfactory means of trade education. As a system of education it presents the following serious disadvantages:

The apprentice must often spend a large portion of his time in activities having no connection with his trade.

The apprentice rarely has his work arranged in a manner best calculated for him to learn his trade most quickly and efficiently. Shop work is so planned that a journeyman may turn out the largest quantity of commodities in a given time, not that an apprentice may gain the most skill in such time.

The apprentice is almost never given the underlying theory of his trade, nor an understanding of the parts of the trade in all their relations, nor a knowledge of the trade as it fits into the industrial world as a whole. He may attain by imitateness great manual skill, but he is not taught to think his way through a problem, nor to acquire a resourcefulness that will make him equal to any unusual situation.

The instructor of an apprentice, commonly the foreman or a journeyman, is seldom well qualified for teaching.

The interests of the apprentice and those of the employing firm are not always identical. An employer oftentimes finds it

profitable to give his apprentice for a long period the duties of a helper, whose tasks neither require nor develop skill. A helper, avowedly employed as such, receives larger wages than an apprentice because it is not expected that a part of his compensation shall be in the form of instruction in the trade. To place the apprentice on the work of the helper for any considerable time is to obtain cheap labor at the sacrifice of the apprentice's attainment of skill in the work.

Again, the apprentice may be kept on one process for a longer period than is necessary for him to learn it. This often happens in the case of machine tending. The work is automatic and requires little skill. Yet it must be done and the firm finds it cheaper to put the apprentice on such work at almost no wages than to employ the unskilled laborer who is not bargaining to learn the trade as a whole and must consequently have larger wages.

Sometimes a firm has a process peculiar to its establishment, or at least to only a few establishments. The process may be a difficult one and much time may be required to master it. It is most advantageous to the firm to specialize its apprentices in the line of a single process. Their efficiency becomes higher and the expenses of production consequently lower. But aside from the common objection to narrow specialization there is ever the danger that such a specialized worker may be thrown out of the employment of his firm at some time, and, without a knowledge of the other phases of his trade, be thrown back into the ranks of unskilled laborers.

The want of identity of interest between employer and apprentice is further disclosed in one of the most telling indictments against the old system of apprenticeship, viz., the regulation, chargeable to the employer as well as to the union, that an apprentice shall serve a fixed term of years at fixed wages, regardless of the advancement made. No allowance is made for a difference of individual ability or individual effort. Nothing could more effectually kill the apprentice's best endeavor than such utter lack of incentive through recognition of merit by better wages or a shortened term. If the apprentice becomes skilled

a year before the close of his term, as some apprentices are capable of becoming, he must still be kept on apprentice's wages, a policy advantageous to his employer alone.

II. THE TRADE SCHOOL

The recognized inefficiency, under existing conditions, of the apprenticeship system, has led to a widespread interest in the question of trade schools. In the professions apprenticeship has been superseded by training in professional schools, and with the most satisfactory results. Why should not an analogous solution be found for the problem of trade education?

The private trade school exists, but it labors under serious handicaps. Any good trade school must have adequate equipment and competent instructors, and these are not to be had without large financial outlays. Equipment is much more expensive than that for general instruction, and the salaries of capable trade-school instructors at present are usually higher than the salaries of those who teach in academic schools. Unless the private trade school is well endowed (and such schools are so few that they may be left out of the reckoning) it must depend upon large tuition fees to pay its running expenses. But such fees the public is slow to pay, unless the school is well and favorably known, and even the well-known private trade school charging high fees must draw its students from a wide area.

There are many parents who realize the financial value which trade education would bring to their children but who are unable to avail themselves of its benefits. The direct outlay required and the necessity of the child's earning immediate wages are effectual barriers. As a matter of fact, the really efficient private school reaches a pitifully small number of those who need trade instruction, and if tuition fees are reduced to attract larger numbers the efficiency is likewise reduced. There are a few trades, however, in which the wages are so attractive and the schools for which are, as yet, so few in number, that, even with large fees, these schools are able to keep up an enrolment sufficiently large to make the enterprise

a paying one. A score of these situated in the several large cities of the country might easily be named. But they are touching only a very small part of the uneducated and unskilled youth of the country, and can never become widely popular. The very classes who need their services most can least afford to avail themselves of their help.

If trade schools ever become a large factor in the industrial life of our country, they must almost of necessity be supported at public expense and be controlled by the state or municipality. They must be conducted in the interests of all classes alike and with the greatest possible efficiency.

And yet, up to the present, little progress has been made in this direction, particularly as regards the day trade school. Much more is being done in establishing night schools, especially the industrial schools, which give industrial instruction suited to the needs of specific trades, leaving the manual training in the trade to the shop.

On this point the New Jersey Commission on Industrial Education, referring to these schools as Industrial Improvement Schools, has this to say:

No trade schools have been established by the states, although state-aided schools (especially land-grant schools in the South) sometimes have trade departments. Municipalities have made very little progress in the establishment of trade schools, nor are they likely to move rapidly in this direction, if we may judge from the experience of the cities of Wisconsin, Massachusetts, New York, and other states. The Industrial Improvement School, on the other hand, has already obtained a substantial foothold in nearly every state of the Union, and during the past five years it has made greater progress in America, far and away, than any other type of industrial school.¹⁸

Under the Trade School Act of 1907 passed by the Wisconsin legislature, Milwaukee was permitted to take over a private trade school, established the previous year. No other city of the state has taken advantage of this act, which is general in character, even though passed for Milwaukee's special benefit. The Milwaukee School of Trades came under the supervision of

¹⁸ *Report of the Commission on Industrial Education in the State of New Jersey* (1909), 58.

the Milwaukee Board of Education on July 1, 1907. It is supported by the city without aid from the state. Instruction is given in both day and evening classes in four trades: pattern-making, woodworking, the machinist's trade, and plumbing. Tuition is free to residents between the ages of 16 and 20. The fact that over one-half (89 out of 156) of the total enrolment are night students indicates the great need of helping the boy already at work. Moreover, there is clearly shown in these figures the desire of the boy to be at his trade and receiving wages while learning it.

Massachusetts has taken a long step forward in providing industrial education, but as yet little has been done in the way of establishing public trade schools. Two notable exceptions are found in the evening trade schools of Cambridge and Springfield.

In earlier paragraphs the disadvantages of the ordinary apprenticeship, as a means of trade education, have been indicated. The trade school also, even at its best, presents serious defects. The trade-school student is not kept face to face with the conditions of commercial production. The output of his labor goes to the junk heap or is used for other practice work; consequently the necessity for careful attention does not impress itself upon him. Again, he is not likely to perceive the importance of speed in work. It is the universal testimony of manufacturers that speed—almost the most important component of skill under modern conditions—is rarely acquired in trade schools.

Of many trades, it is utterly impossible to give a boy in a school anything more than a general knowledge. This is due to the impossibility of the school's possessing the necessary equipment or the environment in which the trade is carried on. The locomotive engineer must get most of his training by working up through gradations of closely related employments. Many of the machine trades require an equipment that could not be duplicated by the trade school except at an expense that would make the cost of the education an effectual barrier.

In some industries, particularly in the group centering about railway transportation, the technical requirements are too com-

plicated and too varying to admit of the trade school alone meeting the conditions. Only the instructor who understands these technical requirements and who is in constant touch with the varying conditions is able to adapt his instruction to the needs of the trade. The advanced type of apprenticeship employed by most of the railways of today combine shop and school instruction.

III. THE NEW APPRENTICESHIP

The need of the time is obviously a system of training which shall combine the advantages of the apprenticeship system with those of the trade school. Many industrial establishments have undertaken to develop such a system for the purpose of supplying their own need for trained workers. Examples of concerns which have established such systems are the General Electric Company at Lynn, Mass.; the Westinghouse Air Brake Company, at Pittsburgh, Pa.; the International Harvester Company, at Chicago; and the New York Central Railway Company. Scores of other firms might be named.

Such schools can, however, provide only for the training of a relatively small part of the skilled workers. A private company cannot be expected to educate a much larger body of skilled workmen than its own business requires. What is needed is a technical school, maintaining its own independence, yet procuring for its students the advantage of actual experience in commercial work, through co-operation with business firms. Such a plan, which may be characterized as an apprenticeship in which the oversight is retained by the school, has recently been developed, and promises to gain wide acceptance.

The best-known co-operative courses of this character are those given in mechanical, chemical, and electrical engineering in the College of Engineering of the University of Cincinnati. Practically all the firms of any size in Cincinnati, which are in a position to co-operate, stand ready to do so. The courses extend over a period of six years, half in shop practice and half in school instruction. Each class is divided into two sections, alternating each week between shop and school. Students are paid for their shop work on a scale of wages beginning at 10

cents per hour and increasing at the rate of 1 cent per hour every six months, making the total earnings of the course about \$1,800.

These co-operative courses have been given for three years and are proving of great value from the point of view of the student in supplying superior instruction at a low cost, from the point of view of the school both in economy of equipment and in effectiveness of instruction, and from the point of view of the manufacturer, who welcomes any method that will furnish the high grade of skill which he needs. Professor Hermann Schneider, dean of the College of Engineering, characterizes the plan in these words:

The fundamental principle underlying the course is based upon the rational assumption that the proper way and the only way for a young man to learn the practical side of his profession, together with business details and an intimate knowledge of the labor problem, is by working as a regular employee in a commercial shop; and further, that the only place where he can learn properly the scientific and the cultural subjects is at a school under trained teachers. This further implies that the school work and the practical work should, as far as possible, go hand in hand, so that the young man may step from school to business just as readily as he does from one promotion to another in after life. The writer believes this principle to be all-important and to apply to all engineering and industrial education.¹⁷

Two schools widely separated in location and differing somewhat in purpose and in character of management have followed a modification of the University of Cincinnati plan. The Lewis Institute of Chicago, a private polytechnic School, and the metal manufacturers of Chicago have, since the beginning of the year 1909, been co-operating in the training of students through school instruction and shop practice. The course extends over a period of two years of fifty weeks per year, twenty-four weeks in the school and twenty-six weeks in the shop. The work alternates week by week between the shop and the school. The employer furnishes the shop practice free, pays \$50 tuition per year for the school instruction, and \$5 wages for each week in the shop.

A public school, the Fitchburg (Mass.) High School, has had a similar plan in operation for nearly a year. The course,

¹⁷ *Engineering News*, July 9, 1908.

of four years' duration, is patterned somewhat after that of the University of Cincinnati. After the first year, which is spent wholly in the school, the boys alternate weekly between school and shop. Instruction in the operation of lathes, planers, drilling machines, bench and floor work, and other machine work is given. The boys are paid 10 cents an hour during the first year in the shop, 11 cents the second year; and 12½ cents the third year. According to the report of the superintendent of schools, the plan is giving entire satisfaction both to the boys and to the manufacturers.¹⁸

For some months past the Lowell Textile School, Lowell, Mass., one of the best of the New England industrial schools, having an enrolment on January 1, 1909, of 678 day and evening pupils, has provided for its machine shop practice through the co-operation of a commercial shop, the Kitson Machine Shop, Lowell, Mass. The principal features and advantages of the plan are thus admirably summarized by Mr. George H. Perkins, Head of the Engineering Department:

a) The school purchases from the shop at the regular price per pound castings or forgings which are carefully selected by the shop superintendent and instructor for their representative value for instruction purposes.

b) These castings or forgings are graded as to difficulty and represent as far as possible only one, or at the most two, typical operations.

c) These castings or forgings are machined and finished in accordance with blue-prints and specifications furnished by the shop and the actual shop methods are followed wherever possible.

d) The instructor in direct charge of the work is assistant superintendent of the shop proper and is a most competent and experienced man. Arrangements have been made with the shop so that he devotes eight hours per week to the school work, four of which are given to the evening classes.

e) The finished work, if fully conforming to the requirements of the shop inspection made by the instructor, is returned to the shop and credit is given.

The advantages of this plan when properly carried out with the co-operation of a commercial shop are:

1. A commercial element is introduced into the instruction work, thus holding the student's attention, and the inspection and acceptance of his work furnishes the strongest incentive for careful and painstaking performance.

¹⁸ See *School Report of the City of Fitchburg, Mass., 1908, 19-28.*

2. The expense to the school is small, the value of the accepted work offsetting the cost of material and work rejected by inspection.

3. The school-shop equipment must consist of tools adapted for real shop work and not of the type so often found and built for school use only.

4. The best type of practical instructor is furnished and, as he serves only part time, a much higher-grade man than is ordinarily attracted to school shops is available.

5. The expense to the shop is negligible except the time allowed the instructor, and after a sufficient period of co-operation, experimental work of various kinds could be carried on in the school shop which would be of mutual benefit.

It must be understood that this plan is in no way intended to train men for the purposes of this particular shop, nor is the shop a material gainer on the work done, which necessarily is not large in amount or value. The sole object is to give the student as practical training in shop work as possible and create his interest in and for commercial work. Thus far the working of this plan is entirely satisfactory and would seem to be perfectly feasible and practicable wherever broad-minded manufacturers are willing to co-operate with the schools in a similar way.¹⁰

There is much to be said in favor of such a method of trade training, though conditions are not always such as to make the co-operation possible. If a plan could be devised whereby such instruction could be made generally available at a minimum of expense to the pupil, and could be supervised as a part of our public-school system, trade and industrial education in America might soon reach the high point of development that it has reached in Germany.

IV. THE VALUE OF TRADE EDUCATION

The kind of training which is here called the new apprenticeship involves heavy expenditures of public funds, if it is to be made accessible to all, or even to a large number of those who aspire to the trades. We must therefore inquire whether the expenditures will be justified by the returns. Does the thoroughly trained worker possess advantages that single him out from among his less-favored fellows, or do these manage somehow to pick up a knack of doing things that serve them practically as well?

¹⁰ *American Machinist*, June 17, 1909.

The new apprenticeship is of too recent origin to admit of a summary of results. In default of such a summary we may appeal to the data for the trade schools. Our conclusions will err on the side of safety, since no one can doubt that the new apprenticeship offers far more effective training than the trade schools can offer.

A study of the actual wages received by graduates of trade schools as compared with wages paid to unskilled laborers and to laborers trained by the old apprenticeship system has recently been made by the Commission on Industrial Education in the State of New Jersey, based upon the average weekly earnings of the graduates of the Newark Technical School and the average weekly earnings of skilled and unskilled laborers in the building trades and machine industries in the United States who have not had technical training.²⁰

The Newark Technical School has been established since 1884, thus giving ample time to demonstrate what its graduates can do. It gives evening instruction from the first of October to the middle of May in courses running from two to five years in length. Most of the courses are strictly industrial. There are given, however, courses in applied electricity, electroplating, and plumbing. The school is supported by state and municipal funds. About four hundred students are enrolled each year.

The Commission on Industrial Education has this, in part, to say upon this study:

The record as it stands means that the average graduate of the Newark Technical School is earning \$1,000 per annum more than he would have received if he had not attended the school. This is equivalent to placing \$25,000 in the bank at 4 per cent interest. Or, it may be considered that every graduate of such school adds \$25,000 to the wealth of the state. In the machine industries the showing is still greater. In every case, during the course, earning was combined with learning, and instances are at hand where salaries were raised as soon as the employers heard that the workers were availing themselves of the opportunities of the school.²¹

²⁰ From statistics compiled by the United States Bureau of Labor and Commerce.

²¹ *Report of the Commission on Industrial Education in the State of New Jersey* (1909), 35.

A study²² somewhat similar to the above has been made by Mr. James M. Dodge, president of the American Society of Mechanical Engineers, who, in his painstaking way, has worked out from a large mass of data just what average vocational training will do for the average youth.

The average boy at sixteen years of age is without training or skill and has, as Mr. Dodge shows, an earning capacity of three dollars a week. At the end of his seventeenth year, the average earnings of the so-called unskilled laborer are four dollars a week. His earnings steadily increase till his twenty-second year, when he reaches \$10.20, the high-water mark of the average unskilled laborer's wages. The shop-trained worker, even as an apprentice, earns from the beginning more than the untrained worker of the same age. By the time he is twenty-four years of age, however, he has reached his maximum wages, \$15.80 a week.

The worker trained in the trade school feels at once the influence of superior instruction on his efficiency. From the start his wages exceed, and shortly far exceed, those of either the unskilled or the shop-trained laborer of the same age. But at thirty-two his greatest earning capacity is reached in a wage of \$25.00 a week.

The technically trained young man receives practically nothing for the first few years. Until nineteen years of age, he receives less than the unskilled worker. Until he is past twenty-two his wages are less than the shop-trained worker, and until he is past twenty-five he receives less wages than the

²² For further examples confirmatory of these studies, indicating the influence of trade education upon wages, see the following: (1) *Report of the School Board of the City of Springfield, Massachusetts* (1908), 10. Statistics are given showing the average initial and present earnings of the graduates of the Springfield Technical High School in the classes of 1903, 1904, 1905, 1906, and 1907. (2) *Bulletin No. 4* of the National Society for the Promotion of Industrial Education, 42-44. Statistics are given showing the average initial and present earnings of girls trained in the Boston and the Manhattan Trade Schools for Girls. Various employments are selected. (3) *Bulletin No. 6* of the United States Bureau of Education, entitled the "Apprenticeship System in Its Relation to Industrial Education" (1908), 59-60. Statistics show the increased earning power of the apprentice trained in the Boston North End School for printers over that of the apprentice not so trained.

young man educated in the trade school. But from that time on his wages are not exceeded by those of either of the other classes. At thirty-two, when the young man of the trade school is receiving his maximum of \$25.00, the technically trained worker attains his highest earning power, \$43.00 a week.

The fact appears, then, to be established that trade education pays; that, in fact, the increased earnings to which it gives rise greatly exceed its cost. It is indeed true that thoroughly trained laborers are at present relatively few and therefore their services bear a scarcity value. It would, therefore, hardly be safe to conclude that a general system of industrial training would under all circumstances give to each workman advantages equal to those enjoyed by the favored few at present. Nevertheless, in view of the vast possibilities for further economic development in the United States that would be thrown open by the provision of an adequate number of trained workmen, and in view of the advantages in international competition to be secured through the same means, it is reasonable to conclude that the results of universalizing industrial training would be a leveling up of wages, not a leveling down. The workers who now enjoy a favored position have no reason to regard improvement in the methods of industrial training for the masses of the laboring population as a menace to their own material interests. To all other classes in society such improvements are an unmixed good.

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